

WOOD MOTHS: WITH SOME ACCOUNT OF THEIR LIFE-HISTORIES.

Chiefly Compiled from the Notes of Mr. R. THORNTON, of
Wallsend, N.S.W.

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Through the liberality of Miss Georgina King, of Homebush, the Technological Museum has recently acquired a very fine collection of Wood Moths, belonging to the genera *Leto*, *Gharagia*, *Eudoxyla*, and *Cryptophasa*, collected and bred by Mr. Robert Thornton. Subsequently, Mr. J. H. Maiden handed over to me a number of notes on the specimens in this donation, written by the collector, which showed a keen sense of observation and a careful study of their habits.

Later on with the Curator's approval, I had the pleasure of visiting Mr. Thornton, who was good enough to show me his collections, as well as some larvæ in trees still under observation. This paper therefore is chiefly a compilation from his notes, or results of unrecorded personal observation, freely placed at my disposal.

EUDOXYLA EUCALYPTI, Hubn.

There are several specimens of this moth in the collection bred out of the branches and stems of "lignum vitæ" (*Acacia longifolia*). It is a common and very destructive species, found wherever the Acacias are plentiful, but having a decided preference for *A. longifolia* and allied species. I have bred a number of these moths from the Acacias at Rose Bay and other localities near

Sydney, where their larvæ annually kill a large number of trees. The species is very variable both in size and markings; the ground colour is brown, mottled with grey, with irregular black blotches on the forewings, but the black elongate horseshoe-shaped band between the forewings on the thorax is always well defined.

Sydney specimens are smaller and generally darker than those from Newcastle, which are more like Victorian examples. Professor McCoy has given a detailed account of this Goat-moth in his "Prodromus of the Zoology of Victoria," Dec. iii., p. 47.

EUDOXYLA EUCALYPTI (?)

A variety longer and more slender than the typical *E. eucalypti* that we get about Sydney, the creamy white patches on either side of the shoulders shading into ferruginous-brown and again forming another white patch towards the tip of the wing, ending in a mottled patch nearer the tip. The mottled markings on the forewings are larger and more rounded than in the former species, while the hind wings are rich ferruginous-brown, with the darker mottled bands running parallel with the nervures and more distinct than in the typical form.

The females deposit their eggs at the foot of the tree near the ground; the larvæ feed down the roots; Mr. Thornton says he has traced a bore along a root for five feet. The larva is white with dark spots along the sides, and a large rough head. Length when mature 6 inches. When full grown, it bores through the side of the root upwards, spinning a stout felted tube from the root to the surface of the ground, where the top of the bag is much thickened. This felted tunnel varies in length according to the distance of the root from the surface, but we have several a foot in length.

The larva undergoes its metamorphosis in this lined tube, and when the moth emerges, the empty pupa case is left sticking out of the ground an inch or two.

A similar if not identical species attacked the roots of some golden wattles (*A. pycnantha*) growing in my father's garden at Ben-

digo, Victoria, some years ago, and it eventually killed them all. I used to hunt for the moths after finding the empty pupa cases, and I have a specimen over 25 years old. Professor McCoy considers that *E. eucalypti*, finding its bore below the surface of the earth, breaks through the root and prolongs the cocoon, which is otherwise confined to the hollow in the wood; but Mr. Thornton says that the larva of the reddish variety always lives on the roots, and that the smaller darker one is never found out of the trunk or branches.

EUDOXYLA LITURATA.

This fine moth measures from 7 to 8 inches across the wings; its forewings, head, thorax, legs and tip of abdomen are light brown densely clothed with fine grey scales; a narrow black band forms an elongated **V** between the forewing in the centre of the thorax (this is sometimes rounded in front and often rather indistinct in places). Hind wings reddish-brown, the basal portion of the abdomen clothed with reddish down thickest on the sides. A male moth in the collection is not more than one-third this size, but the markings and coloration are the same.

The larva is found in the stems of several Eucalypts, but it shows a marked preference for that of *E. resinifera*, locally known as the "Grey Gum." The moth after leaving her chrysalid shell is generally found upon the trunk of the tree close to the ground; her eggs are laid in a scattered ring upon the bark, the young larvæ boring inwards soon after they are hatched. The larva forms no web over the entrance of its bore, like *Leto stacyi*; and though eating out an irregular oval cavity in the bark does not eat the outer surface of it away, leaving it a thin wall, which eventually dries up and falls away. The small hole by which it first entered is left open, and from it the castings formed in the bore are ejected.

The larva bores upwards as soon as the transverse tunnel reaches the centre of the stem, and it remains feeding in this

bore for upwards of nine years, during which time it crawls backwards and forwards from the entrance, gnawing and enlarging the diameter, so that the passage of escape is always in proportion to the increasing bulk of the larva. For three months, from the beginning of June till the end of August, it remains in a quiescent or torpid state, without moving or feeding; at the end of this period it casts its skin, and again commences to feed, this operation being repeated every season, at any rate for the last few years of its larval existence. When the time comes for its metamorphosis into the chrysalid, it retreats to the apex of the bore, cutting off all communication with the intervening space between by placing a stout felted wad or button at the base, the tip of the abdomen of the chrysalid touching the top of the bore, the head pointing downwards and resting against the wad, and enveloped in a thick yellow viscid secretion.

Changing into a chrysalid in May, the perfect moth emerges early in the following November. Before the moth is ready to come forth, the expansion of the chrysalid dislodges the wad, which falls down the bore, thus liberating the chrysalid, which works its way out to the entrance, protruding through the hole about an inch or more before the skin splits and she crawls out.

The average depth of the bore is about eight inches, but it may sometimes reach to a foot; the diameter is about $1\frac{1}{4}$ inches; and the fully developed larva about eight inches in length. In spite of the thick protective wad, the chrysalid is frequently killed and devoured by ants. But by far its most destructive enemy is a large beetle, *Trogodendron fasciatum* (Fam. *Cleridae*), which Mr. Thornton says, kills a great number of them.

Mr. Thornton had a larva of this moth under observation for several years, and from time to time watched its movements by cutting out a section of the stem of the living tree, which he replaced and pegged back each time he examined it, afterwards breeding out the moth, which is now in the Australian Museum, from the observed larva.

LETO STACYI, Scott.

As Mr. A. Sidney Olliff has given a detailed description of this beautiful moth ("Notes on *Zelotypia Stacyi*, and an Account of a Variety." Proc. Linn. Soc. N.S.W., ii. ser. 2, p. 469, 1887), I confine my remarks to several points passed over by him, or differences in habits as compared with the genus *Eudoxyla*.

The larva, which has been watched for six years, does not bore upwards like the members of the preceding genus, but after eating out the bark in front of the place where it intends to make its bore, it covers the cavity with a fine bag or web of silk covered with small bits of bark, boring into the centre of the trunk, and then turning downwards towards the roots.

It feeds on the stem of the "Grey Gum," which, from specimens obtained from Mr. Thornton, has been identified by Mr. R. T. Baker, of the Technological Museum, as *E. resinifera*. Mr. Olliff states that the Grey Gum upon which it is found is *E. tereticornis*. Mr. Thornton says that, unlike any of the other larvæ, it strictly confines itself to one species of Eucalypt. Hence there would appear to be some slight mistake; though it may be that it attacks both trees.

The larva changes into the chrysalid in December, after having eaten off the web in front of the bore, and placed a thick felty wad or button just inside the opening of the bore; but as soon as the chrysalid skin has become hard and firm, it pushes the wad away and moves freely up and down the bore, which varies in depth from 10-12 inches. It can move up and down the passage very rapidly, the curious file-like rings on the lower edge of the abdominal segments being evidently adapted to helping its locomotion. When nearly mature it has the habit, particularly in the afternoons, of resting in the bore with the top of its head just level with the floor of the cross-bore, and plainly visible from the outside. The moths first appear early in March. Mr. Thornton has found that they never come out after three o'clock in the afternoon; and chrysalids under observation if not out at that

hour can be safely left until the next day. He has bred and captured over 100 specimens of this fine moth, and has succeeded in mounting them very neatly without destroying the remarkable wrinkled structure of the forewings, which if mounted on an ordinary setting-board come out flat and uniform.

With this he has also sent a specimen of what he considers to be a new species of the genus. It is, however, very much worn and damaged, having been found in the bush dead. In my opinion it is certainly not this moth; and from the general form of head and thorax might at first sight be easily mistaken for a large cicada.

EUDOXyla MACLEAYI, Scott.

This is the largest species of the genus, specimens in the collection measuring $9\frac{1}{2}$ inches across the forewings.

The forewings are brown, clothed with fine grey down or scales, together with thicker patches of grey and black down, giving the whole of the centre of the wings a mottled appearance; the hind wings are dark brown. The head, legs and thorax thickly covered with long greyish-brown down; a large black patch rounded in front occupies the centre of the thorax, the central and hind part of it being variegated with grey, somewhat like the markings of a European Death's Head Moth; the base and apex of the abdominal segments are grey; the six inner segments covered with long thick down of a similar colour to the hind wings. The larva of this species has been watched for four years in the trunk of a "white mahogany" (*Eucalyptus tereticornis*), by Mr. Thornton, who says that its habits are identical with those of *E. liturata*. He has bred only one specimen out of the timber, as even in the chrysalis state they invariably die very soon after the log is cut; all his other specimens have been taken after their emergence.

CRYPTOPHAsA IRRORATA, Lewin.

This is a rather common grey and brown moth, feeding and breeding in several species of she-oaks (*Casuarina*) both about Sydney and Newcastle.

Mr. Thornton has given me a long account of the habits of the larva of this moth, from his own original observations. But Lewin, in his work on "New South Wales Lepidoptera," published in 1805, has given such a complete description of their habits and food plants, that it is unnecessary to dwell further on the subject.

CHARAGIA EXIMIA, Scott.

Several specimens of both sexes of this moth are in the collection. The male has both the fore- and hindwings pale bluish-green, the former covered with indistinct wavy markings forming oval rings, and crossed with a line of fine yellow spots in the centre. The female has the head, legs, thorax and forewings bright vivid green, with two circular spots in the centre of each wing, and brown markings on the outer margins; the hindwings are bright reddish-pink with the tips yellowish-green; the first five segments of the abdomen of a similar red colour, the last three the same vivid green as the forewings; she is fully a third larger than the male.

These were watched feeding for three years. The young larva eats a hole in the bark, and forms a thin web over it like the "Bentwing;" then feeding down the centre of the stem, following any angle in the trunk, often makes a bore five feet deep.

Before passing into the chrysalid state it eats the web off, replacing it with a thin wad or button at the entrance of the hole, and though moving up and down the bore, it does not push the wad out of the hole until the moth is ready to emerge.

The larvæ feed upon the Lilly Pilly (*Eugenia smithi*), the water gum (*Phyllanthus ferdinandi*), and the Black Fig (*Ficus aspera*). They change into chrysalids in August, coming out in October in the Wallsend district.

CHARAGIA SPLENDENS, Scott.

The male has the forewings of a delicate pale green, with the centre of the head, fore part of the thorax, a slender stripe along the outer edge of the forewings, and an irregular transverse band

widest in the centre satiny-white ; the outer edges are marbled with a broad band of the same colour enclosing a row of oval rings, with an angular patch containing a similar oval ring and another white patch near the shoulders, the hindwings and abdomen satiny-white.

The female has the forewings, head, thorax and legs pale brown, with a large irregular bright green patch running from the shoulders, and occupying the centre of the wing, a large irregular patch at the tip and two small spots on the hind margin of a similar colour ; hindwings pinkish-red inclining to yellow at the tips and margined with brown behind ; abdomen reddish-brown at tip.

This species breeds annually, forming a thick felty bag all round the branch, and boring a hole several inches down the stem or branch, the larva pupating about the middle of December and the moth coming forth three or four weeks later.

Mr. Thornton has found the larvæ in the following trees and plants—Lilly Pilly (*Eugenia smithi*), Grey Gum (*Eucalyptus tereticornis*), Stringybark (*E. leucoxyton*), Hollyhocks, Rock-lilies and other plants ; while I have bred it from *Eucalyptus robusta* from Botany.

There is a small variety of this species which is never more than an inch across the wings, but is similar in its coloration and habits. The larvæ attack any kind of tree and bush, and though generally very scarce they appear in great numbers every three or four years at Wallsend. It is very likely that these are dwarfed specimens ; and their coming out in such numbers may affect their food supplies, and have thus stunted them.

CHARAGIA sp.

This species is considered a rare one about Wallsend. Mr. Thornton says he has never bred it from any tree but the green wattle (*Acacia decurrens*). The female is a little smaller than *C. splendens* ; the pattern of the forewing is exactly the same, but here the brown tints are much lighter and the bright greens are

replaced with golden yellows, while the hindwings and body are identical, except in being somewhat lighter. The male has the hindwings pale green, the transverse white band very slender, the tips of the wings less marbled, and the white markings on the hind edge of the wings enclosing no circular ring, the hindwings pale whitish-green.

The larva does not form a felty bag round the stem, but after gnawing a furrow half round the branch, covers it with a thin web, and only makes a bore about three inches down the centre of the stem. When ready to pupate, it closes the entrance to the bore with a delicate semi-transparent membranous covering almost as thin as tissue-paper. This species also breeds annually, generally going into the chrysalid state in December, and emerging in January.